भारतीय मानक
Indian Standard

IS 10086 : 2021

सीमेंट, कंक्रीट और पोज़ोलाना के परीक्षणों में प्रयुक्त साँचे — विशिष्टि

(पहला पुनरीक्षण)

Moulds for Use in Tests of Cement, Concrete and Pozzolana — Specification

(First Revision)

ICS 19.060, 91.100.10, 91.100.30

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

December 2021 **Price Group 10**

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

A series of Indian Standards on methods of testing cement and concrete are already in place and are widely used. Reproducible and repeatable test results can be obtained only with standard testing equipment capable of giving the desired level of accuracy. The Sectional Committee had accordingly brought out a series of standards covering the requirements of equipment used for testing cement and concrete, to encourage their development and manufacture in the country.

Accordingly, this standard was first published in 1982 covering the requirements of the moulds used for casting cement or concrete cubes, cylinders and beams for compressive and flexural strength tests on cement and concrete. Also, due weightage was given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in the country.

The Indian Standard which details the methods of compressive, flexural, split tensile strength and bond strength tests, modulus of elasticity, Poisson's ratio, requiring use these moulds is IS 516 (Part 1/Sec 1) : 2021 'Hardened concrete — Methods of test: Part 1 Testing of strength of hardened concrete, Section 1 Compressive, flexural and split tensile strength (*first revision*)'. The same employs use of moulds for which this standard is to be used.

In this revision, the following major changes have been incorporated:

1) Requirements of acrylonitrile butadiene styrene (ABS) plastic and polyurethane for construction of moulds are included.
2) The construction requirements have been updated to address the new materials used to make the moulds.
3) The quality requirements of materials for constitution of moulds has been updated referring to the latest standards.
4) The dimensions and tolerances for cube moulds, cylindrical moulds, beam moulds and gang cube moulds have been updated by introducing the requirements for new materials of the moulds.
5) Special requirements for moulds made of newly included materials have been introduced.
6) Marking clause has been made comprehensive.
7) Title of the standard has been modified to reflect the actual coverage.
8) Sketches of typical moulds have been updated.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of specified value in this standard.

Indian Standard

MOULDS FOR USE IN TESTS OF CEMENT, CONCRETE AND POZZOLANA — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard covers requirements of the moulds used for casting cement or concrete cubes, cylinders, beams and bars for tests of cement and concrete, such as compressive strength, flexural strength , split tensile strength, bond strength, modulus of elasticity, and Poisson's ratio.

1.2 The accessories to testing equipment, such as vibration machine and jolting apparatus are not covered in this standard and are covered in IS 10080 and IS 10078 respectively.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, forms provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subjected to revision, and parties to agreement are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TYPES

3.1 The moulds shall be of following types:

a) Cube moulds of size 50 mm, 100 mm, 150 mm, 225 mm and 300 mm,

b) Cylindrical mould of diameter 150 mm; and of height 300 mm,

c) Beam moulds of sizes 100 × 100 × 500 mm and 150 × 150 × 700 mm,

d) Bar moulds of 25 × 25 × 285 mm size having 250 mm effective length, and

e) Bar mould of 75 × 75 mm size having 150 to 300 mm length.

4 MATERIAL

Material for construction of moulds shall normally be as given in Table 1 and made of cast iron/mild steel conforming to IS 210 or IS 2062 or of acrylonitrile butadiene styrene (ABS) plastic or polyurethane. However, any other material which is non-absorbent and non-reactive with concrete (and mortar) and which shall retain the dimensional stability of the moulds may also be used.

5 DIMENSIONS AND TOLERANCES

The dimensions with tolerances of various types of moulds described at **3.1**(a) to (d) (*see* Fig. 1 to 14) shall be as given in Tables 2 to 5. The dimensions of moulds described at **3.1**(e) shall be such that it shall be possible to cast specimens with a length of 150 to 300 mm and a cross-section as near as practicable to 75 × 75 mm.

NOTES

1 The allowable tolerances for the nominal dimensions, wherever not mentioned, shall be as laid down for coarse class of permissible deviations in Table 1 of IS 2102 (Part 1).

2 For checking the permissible variation in the planeness, the surface should be wholly contained between two planes not further apart than the specified value.

6 CONSTRUCTION

6.1 General

The construction of the moulds shall in general, be in accordance with Fig. 1 to 14.

NOTE — The figures are illustrative only, but the dimensions and minimum requirements where specified shall be binding.

6.1.1 The moulds shall be stout enough to prevent distortion. These shall be constructed in such a manner as to facilitate the removal of the moulded specimen without damage and shall be so machined or manufactured that, when they are assembled ready for use, the dimensions and internal faces shall be accurate within the specified limits. Internal faces of the moulds shall be smooth.

Table 1 Materials for Construction of Metal Moulds

(*Clause* 4)

Sl No.	Mould Type	Part of the Mould	Material	Recommended Indian Standard Specification
(1)	(2)	(3)	(4)	(5)
i)	Cube mould, 50 mm	a) Side plate	Cast iron/mild steel	IS 210/IS 2062
		b) Base plate	Cast iron/mild steel	IS 210/IS 2062
ii)	Cube moulds, 100 mm, 150 mm, 225 mm and 300 mm	a) Side plate	Cast iron	IS 210
		b) Base plate	Cast iron	IS 210
iii)	Cylindrical moulds, 150 mm diameter × 300 mm height	a) Split part	Cast iron/mild steel	IS 210/IS 2062
		b) Base plate	Cast iron/mild steel	IS 210/IS 2062
		c) Capping plate	Cast iron/mild steel	IS 210/IS 2062
iv)	Beam moulds: 100 × 100 × 500 mm and 150 × 150 × 700 mm	a) Side plate	Cast iron	IS 210
		b) Base plate	Cast iron	IS 210
		c) Top plate	Mild steel	IS 2062
v)	Bar mould of 25 × 25 mm size and 250 mm effective length	a) Side plate	Mild steel	IS 2062
		b) Base plate	Mild steel	IS 2062
		c) Reference points (smooth and knurled)	Stainless steel	IS 6527
vi)	Mould of 75 × 75 mm size and 150 to 300 mm length	a) Side plate	Mild steel	IS 2062
		b) Base plate	Mild steel	IS 2062

Table 2 Dimensions and Tolerances for Cube Moulds

(*Clause* 5)

Sl No.	Description	Material of the Mould	Cube Mould Sizes mm				
			50	100	150	225	300
(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)
i)	Distance between opposite faces, *C*, mm	Cast iron/mild steel	50±0.1	100±0.2	*150±0.2	225±0.3	300±0.4
		ABS plastic*				#	#
		Polyurethane*				#	#
ii)	Height of mould, *F*, mm	Cast iron/mild steel	50±0.1	100±0.2	150±0.2	225±0.3	300±0.4
		ABS plastic*				#	#
		Polyurethane*				#	#
iii)	Thickness of wall/wall plate, *D*, mm	Cast iron/mild steel	6	8	8	10	10
		ABS plastic*	6	9.5	9.5	#	#
		Polyurethane*	9	12.5	19	#	#
iv)	Deviation from perpendicularity between adjacent interior faces of the mould, mm, *Max*	Cast iron/mild steel	0.5	0.5	0.5	0.5	0.5
		ABS plastic*				#	#
		Polyurethane*				#	#
v)	Deviation from perpendicularity between interior faces and top and bottom faces/plates of the mould, mm, *Max*	Cast iron/mild steel	0.5	0.5	0.5	0.5	0.5
		ABS plastic*				#	#
		Polyurethane*				#	#
vi)	Length of base plate, *A*, mm	Cast iron/mild steel	120	225	280	375	425

Table 2 (*Concluded*)

Sl No.	Description	Material of the Mould	Cube Mould Sizes mm				
			50	100	150	225	300
(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)
vii)	Width of base plate, *B*, mm	Cast iron/mild steel	95	165	215	300	375
viii)	Thickness of base/base plate, *E*, mm, *Min*	Cast iron/mild steel	6	8	8	10	12
		ABS plastic*	6	9.5	9.5	#	#
		Polyurethane*	15	15	20	#	#
ix)	Permissible variation in the planeness of interior faces for, mm, *Max*	Cast iron/mild steel	0.04	0.04	0.04	0.04	0.04
	a) New moulds	ABS plastic*	0.06	0.06	0.06	0.06	0.06
	b) Moulds in use	Polyurethane*	0.06	0.06	0.06	#	#
			0.08	0.08	0.08	#	#
x)	Permissible variation in the planeness of base/base plate, mm, *Max*	Cast iron/mild steel	0.03	0.03	0.03	0.03	0.03
		ABS plastic*	0.06	0.06	0.06	#	#
		Polyurethane*				#	#

* The letter symbols are indicated in Fig. 9 and 10

Size is not available

NOTE — The length and width of base plate depend upon the arrangement provided for clamping the mould to the base plate and hence may vary from the values specified in the table.

Table 3 Dimensions and Tolerances for Cylindrical Moulds

(*Clause* 5)

Sl No.	Description	Material of the Mould	Cylinder Mould of Size 150 mm × 300 mm
(1)	(2)	(3)	(4)
i)	Mean internal diameter, *A*, mm	Cast iron/mild steel	150 ± 0.2
		Polyurethane	
ii)	Actual internal diameter in any direction, *B*, mm	Cast iron/mild steel	150 ± 0.5
		Polyurethane	
iii)	Height, *C*, mm	Cast iron/mild steel	300 ± 1
		Polyurethane	
iv)	Permissible variation in the planeness of cylindrical wall/wall plate, mm, *Max*	Cast iron/mild steel	0.05
		Polyurethane	0.06
v)	Thickness of wall/wall plate, *D*, mm	Cast iron/mild steel	6
		Polyurethane	25
vi)	Diameter of base plate, *E*, mm	Cast iron/mild steel	300 ± 3
		Polyurethane	
vii)	Diameter of capping plate, *F*, mm	Cast iron/mild steel	195 ± 2
		Polyurethane	
viii)	Thickness of base/base plate/capping plate, *G*, mm	Cast iron/mild steel	6
		Polyurethane	16
ix)	Permissible variation in the planeness of base/base plate/capping plate, mm, *Max*	Cast iron/mild steel	0.03
		Polyurethane	0.06

Table 4 Dimensions and Tolerances for Beam Moulds

(*Clause* 5)

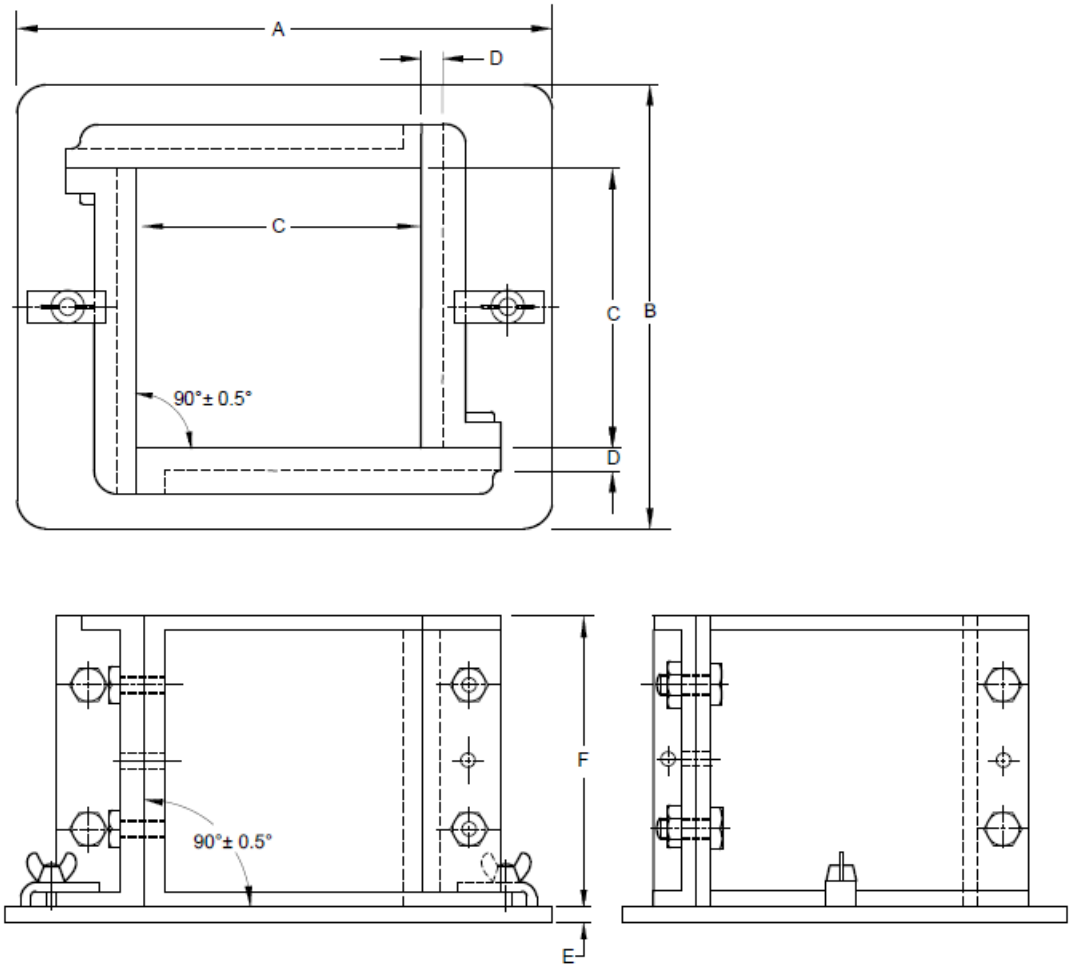
Sl No.	Description	Material of the Mould	Beam Mould of Sizes	
			100 × 100 × 500 mm	150 × 150 × 700 mm
(1)	(2)	(3)	(4)	(5)
i)	Length between internal faces, *A*, mm	Cast iron/mild steel	500	700
		Polyurethane		
ii)	Width between internal faces, *B*, mm	Cast iron/mild steel	100 ± 0.2	150 ± 0.2
		Polyurethane		
iii)	Height, G, mm	Cast iron/mild steel	100 ± 0.05	150 ± 0.05
		Polyurethane		
iv)	Thickness of wall/wall plate, *E*, mm	Cast iron/mild steel	9	12
		Polyurethane	19	19
v)	Length of base plate, C, mm	Cast iron/mild steel	600	830
vi)	Width of base plate, *D*, mm	Cast iron/mild steel	225	275
vii)	Thickness of base/base plate, *F*, mm	Cast iron/mild steel	8	10
		Polyurethane	25	25
viii)	Deviation from perpendicularity between interior faces and top and bottom planes of the mould, degree, mm, *Max*	Cast iron/mild steel	0.5	0.5
		Polyurethane		
ix)	Permissible variation in the planeness of internal surfaces, mm, *Max*	Cast iron/mild steel	0.03	0.03
	i) In a length of 150 mm		0.1	0.1
		Polyurethane	0.06	0.06
	ii) Overall		0.1	0.1

Table 5 Dimensions and Tolerances for Metal Bar Moulds

(*Clause* 5)

Sl No.	Description	Dimension mm
(1)	(2)	(3)
i)	Distance between inner ends of reference points (effective gauge length)	250 ± 2
ii)	Width between inner surfaces	25 ± 0.8
iii)	Height	25 ± 0.8

NOTE — The dimensions given in the table shall also apply to moulds in use.



(For Dimensions See Table 2)

Fig.1 Typical Cast Iron/Mild Steel Cube Mould

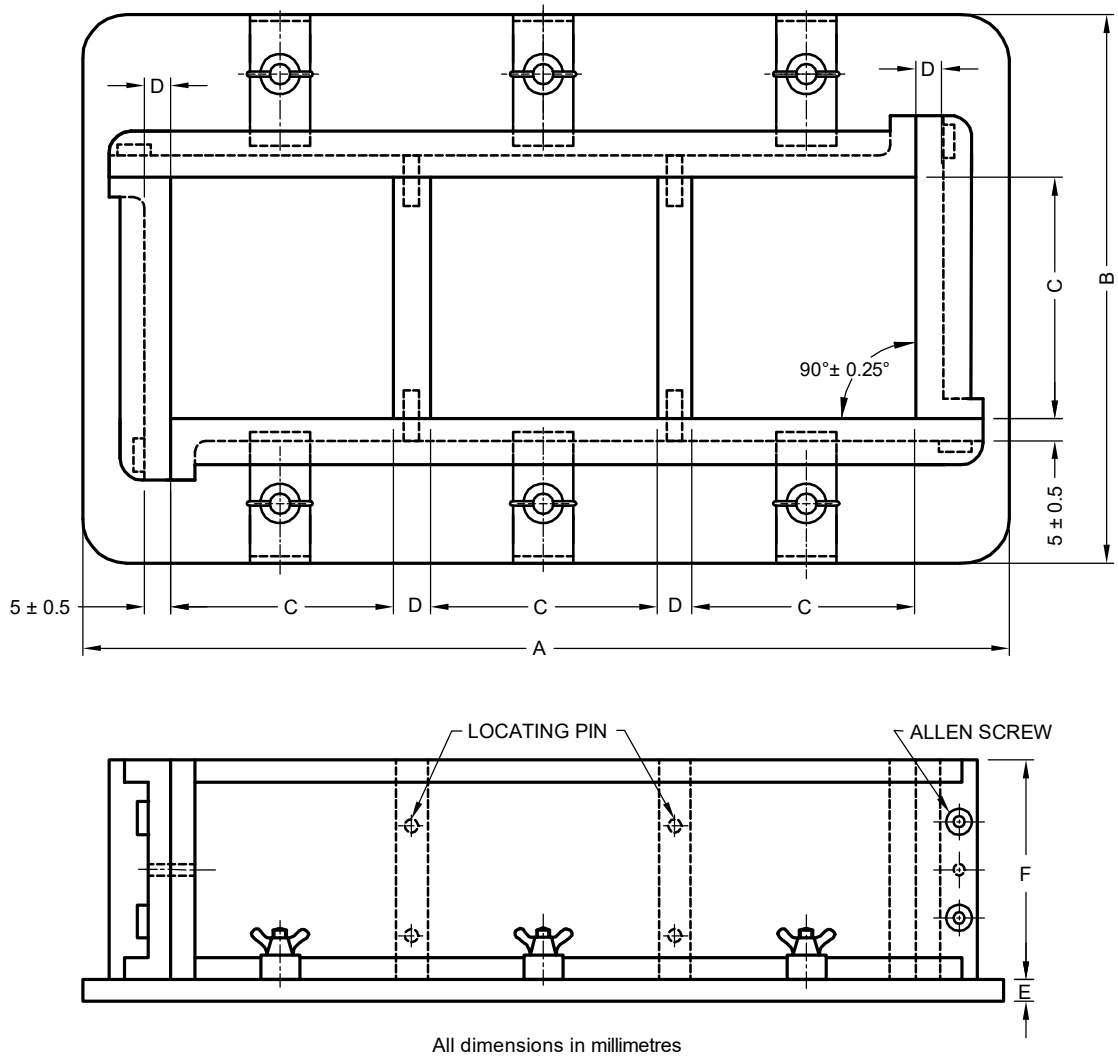
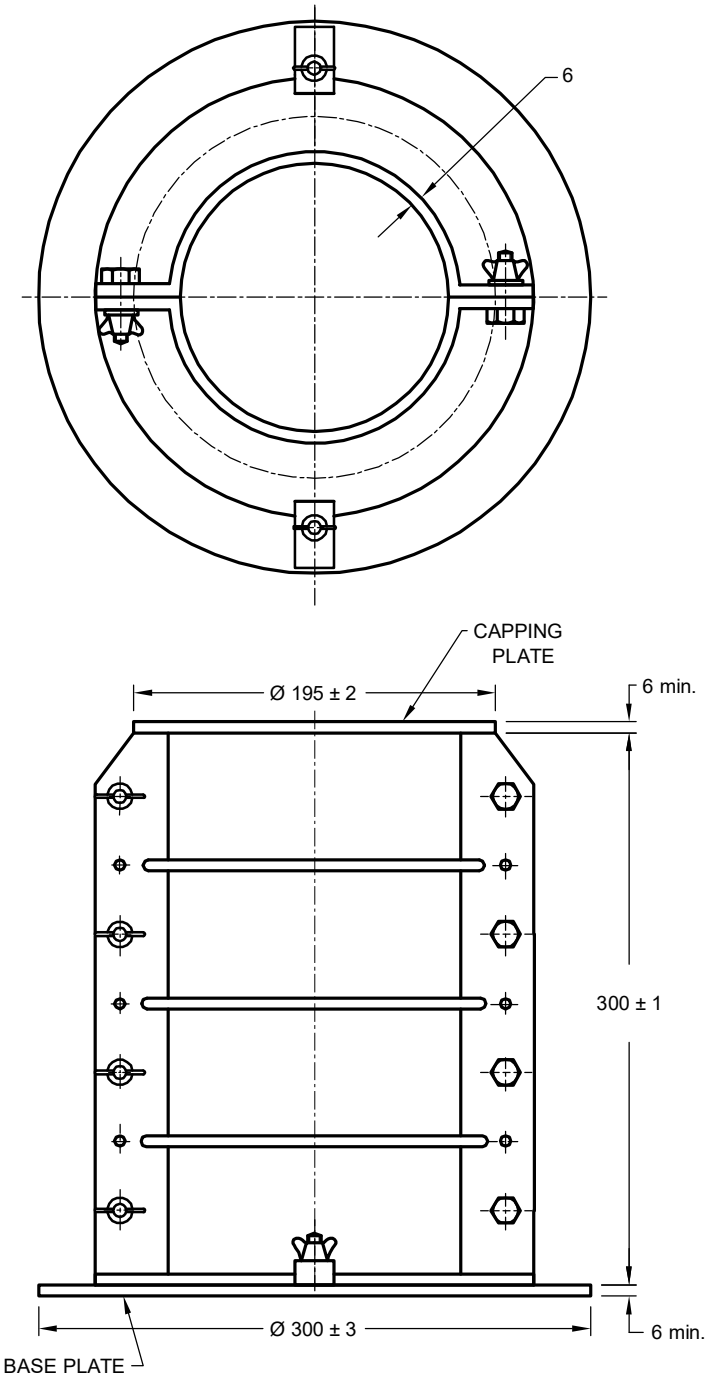


FIG.2 TYPICAL CAST IRON/MILD STEEL 3-GANG 50 MM CUBE MOULD



All dimensions in millimetres

FIG.3 TYPICAL CAST IRON/MILD STEEL CYLINDER MOULD

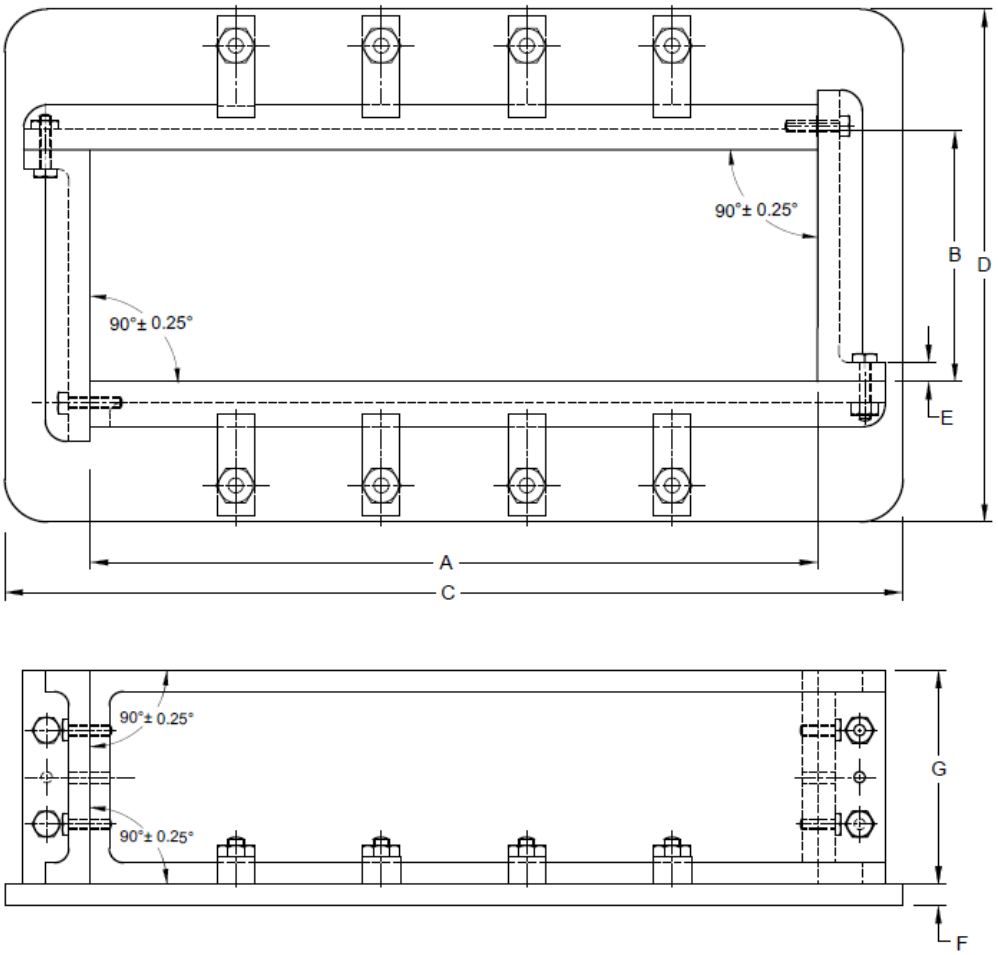


FIG. 4 TYPICAL CAST IRON/MILD STEEL BEAM MOULD

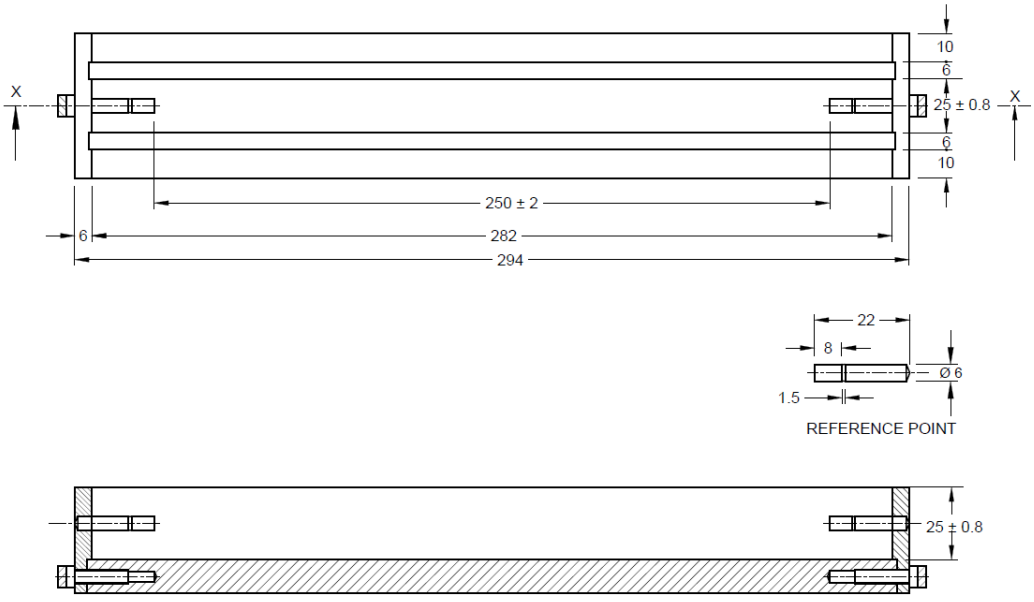


FIG. 5 TYPICAL METAL BAR MOULD

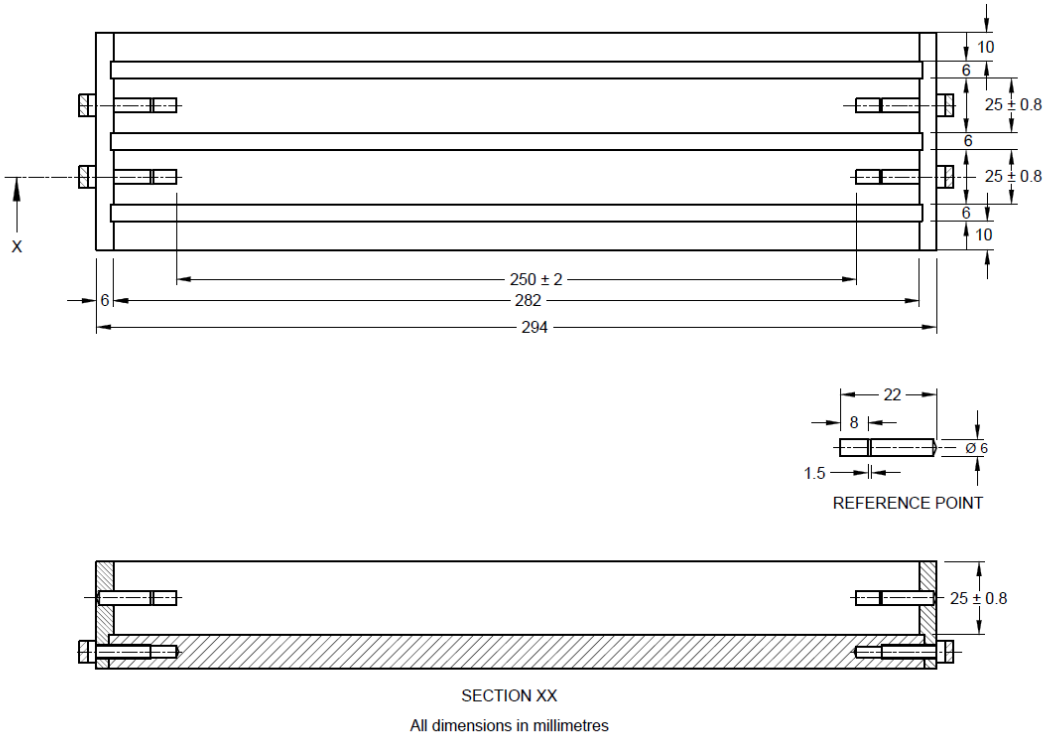


FIG. 6 TYPICAL METAL BAR MOULD (TWO MOULD COMPARTMENTS)

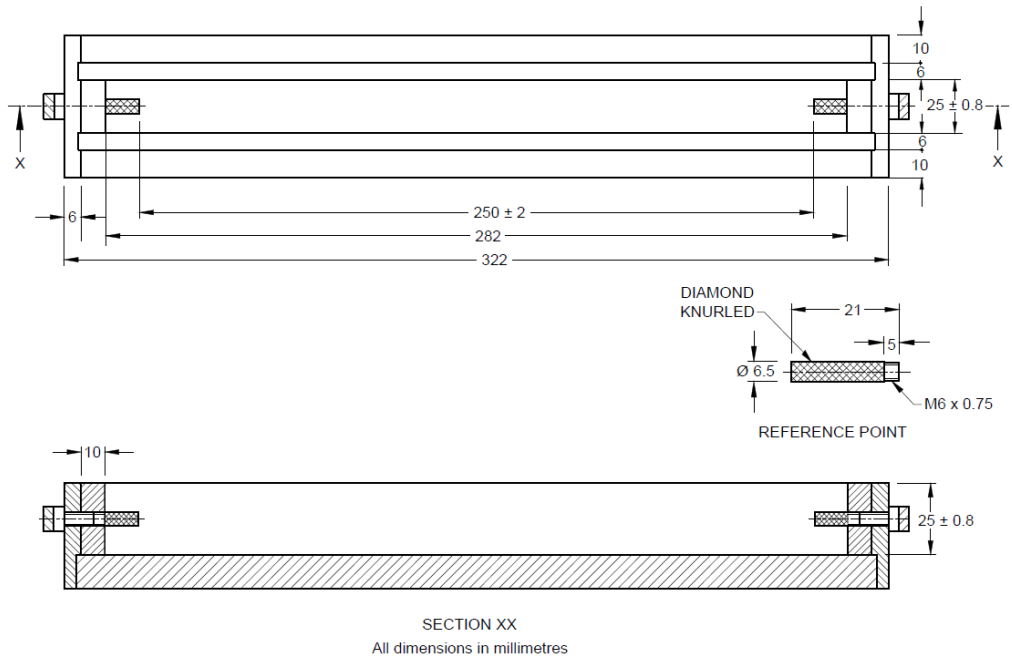


FIG. 7 TYPICAL METAL BAR MOULD

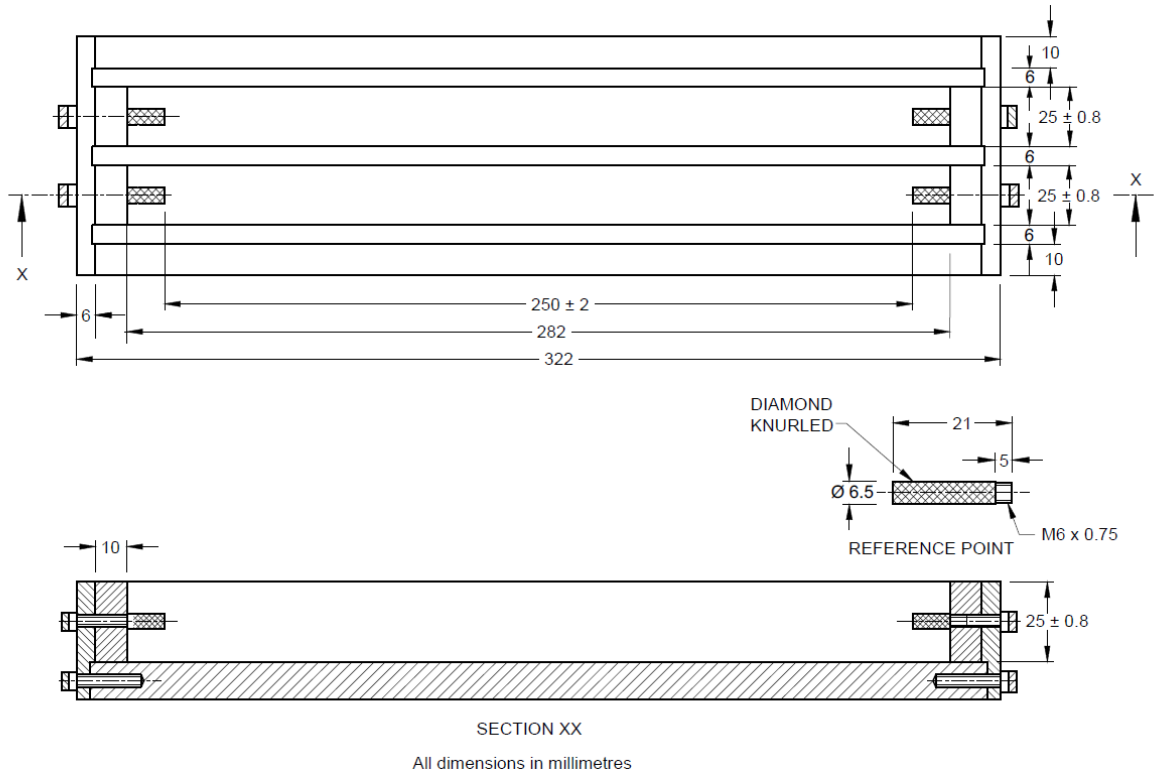
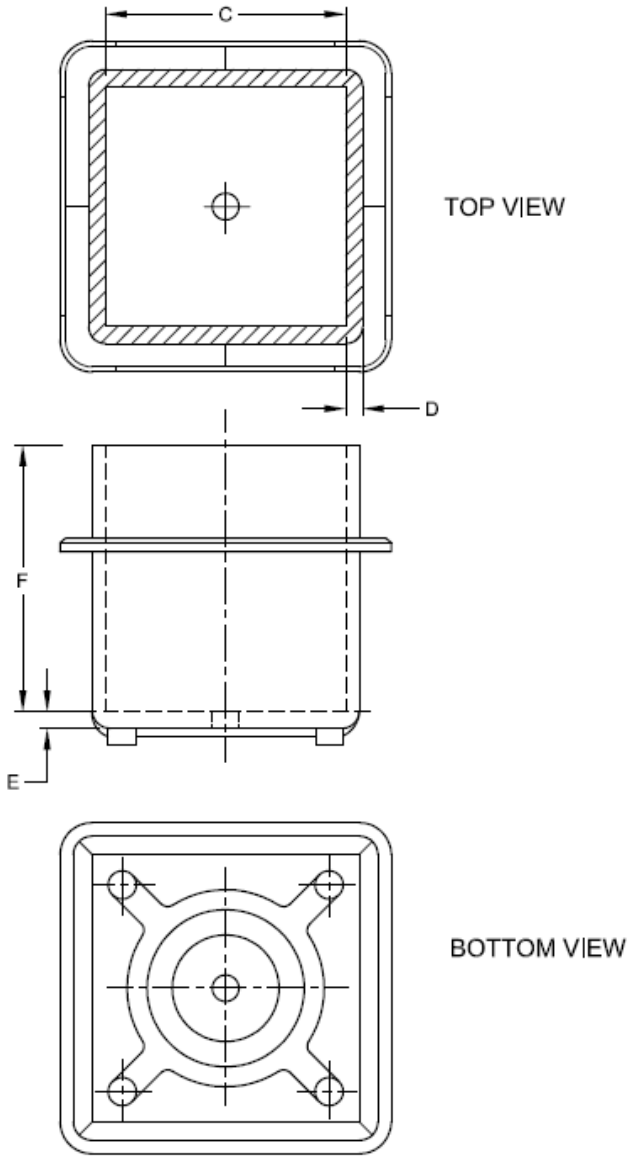
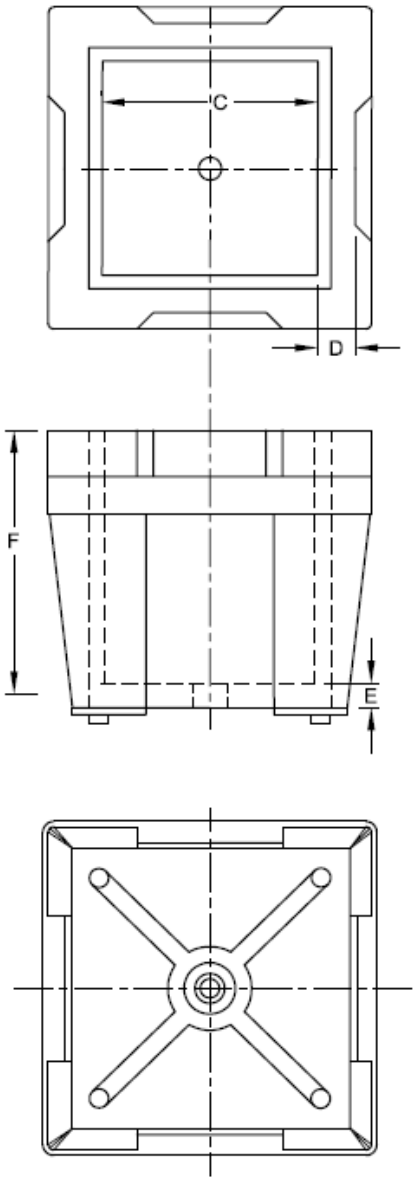


FIG. 8 TYPICAL METAL BAR MOULD (TWO MOULD COMPARTMENTS)



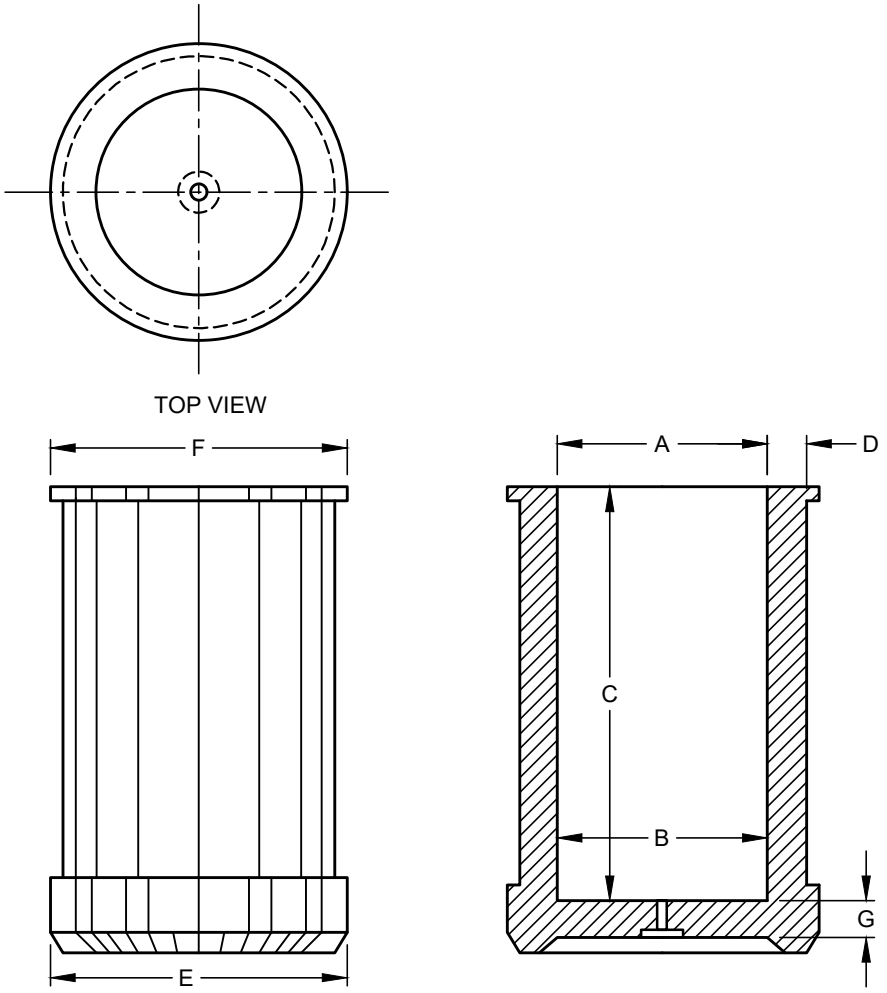
NOTE — Depending on chemical composition, the wall/base thicknesses may vary to enable arrive at dimensions of the concrete cube.

FIG. 9 TYPICAL ABS PLASTIC CUBE MOULD



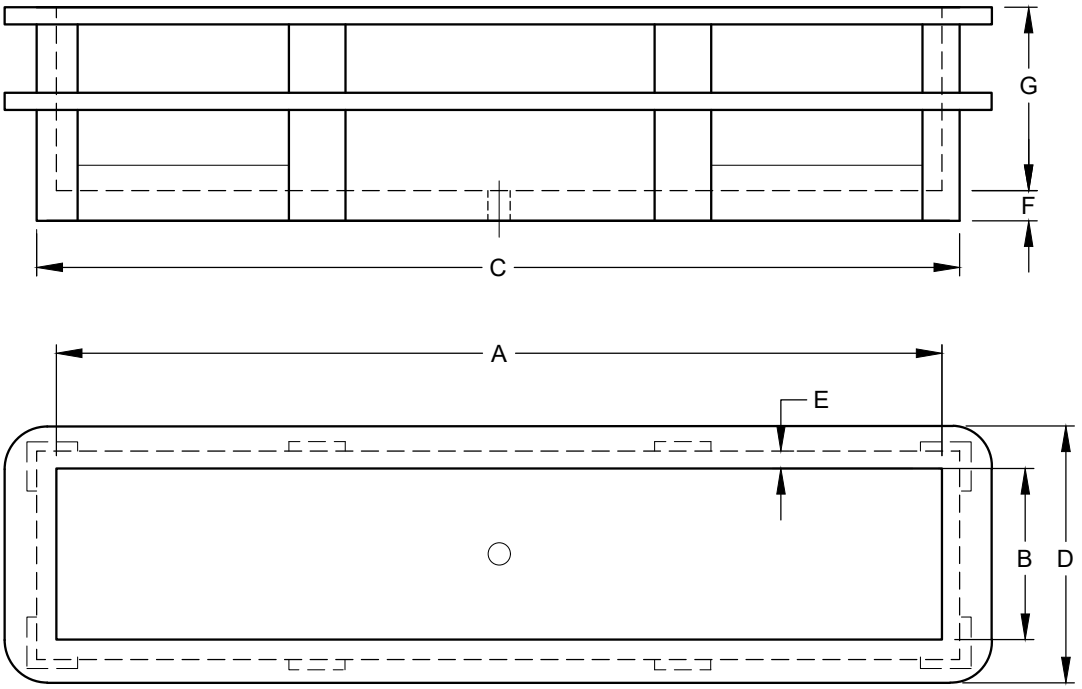
NOTE — Depending on chemical composition, the wall/base thicknesses may vary to enable arrive at dimensions of the concrete cube.

FIG. 10 TYPICAL RIGID POLYURETHANE CUBE MOULD



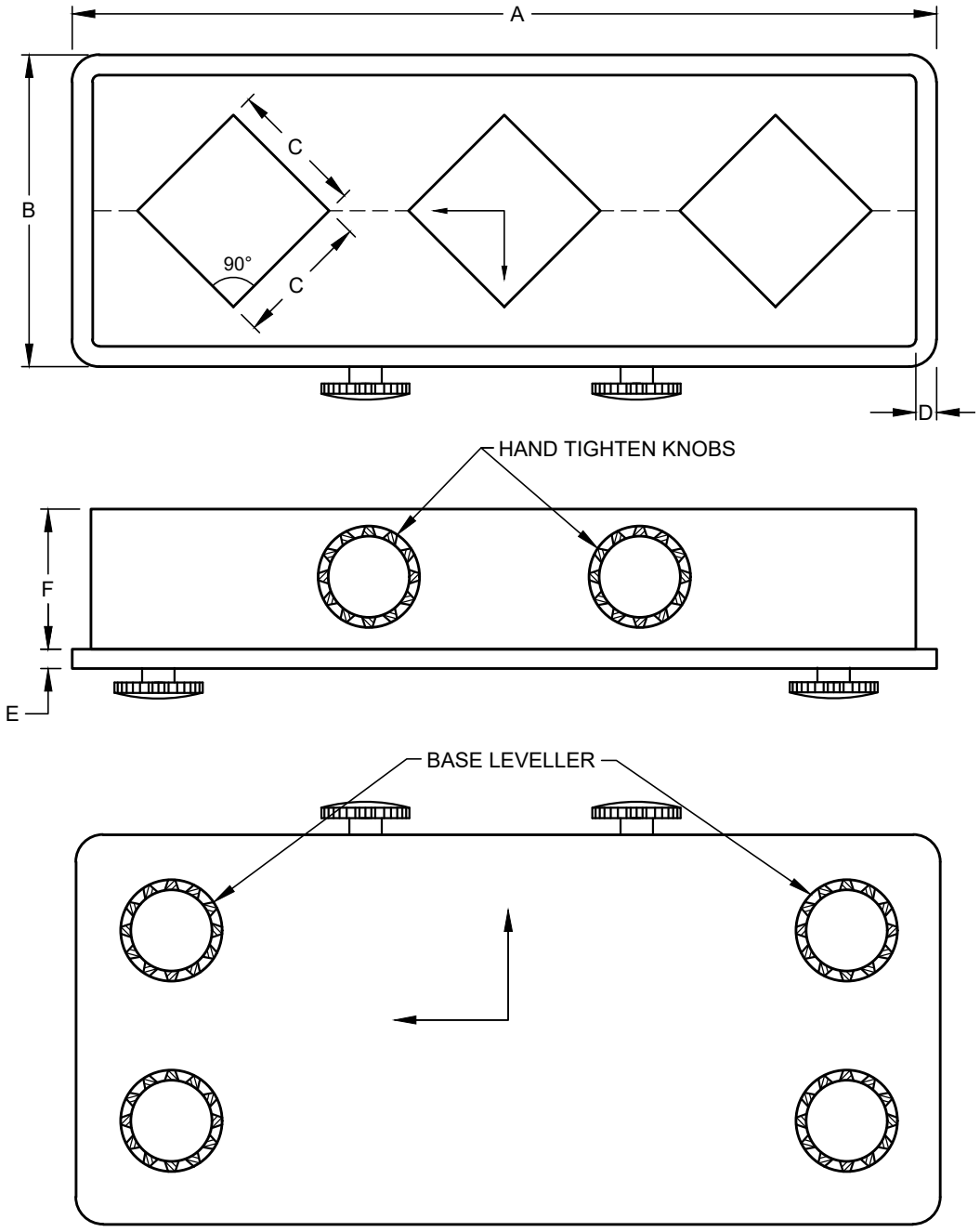
NOTE — Depending on chemical composition, the wall/base thicknesses may vary to enable arrive at dimensions of the concrete cylinder.

FIG. 11 TYPICAL RIGID POLYURETHANE CYLINDRICAL MOULD



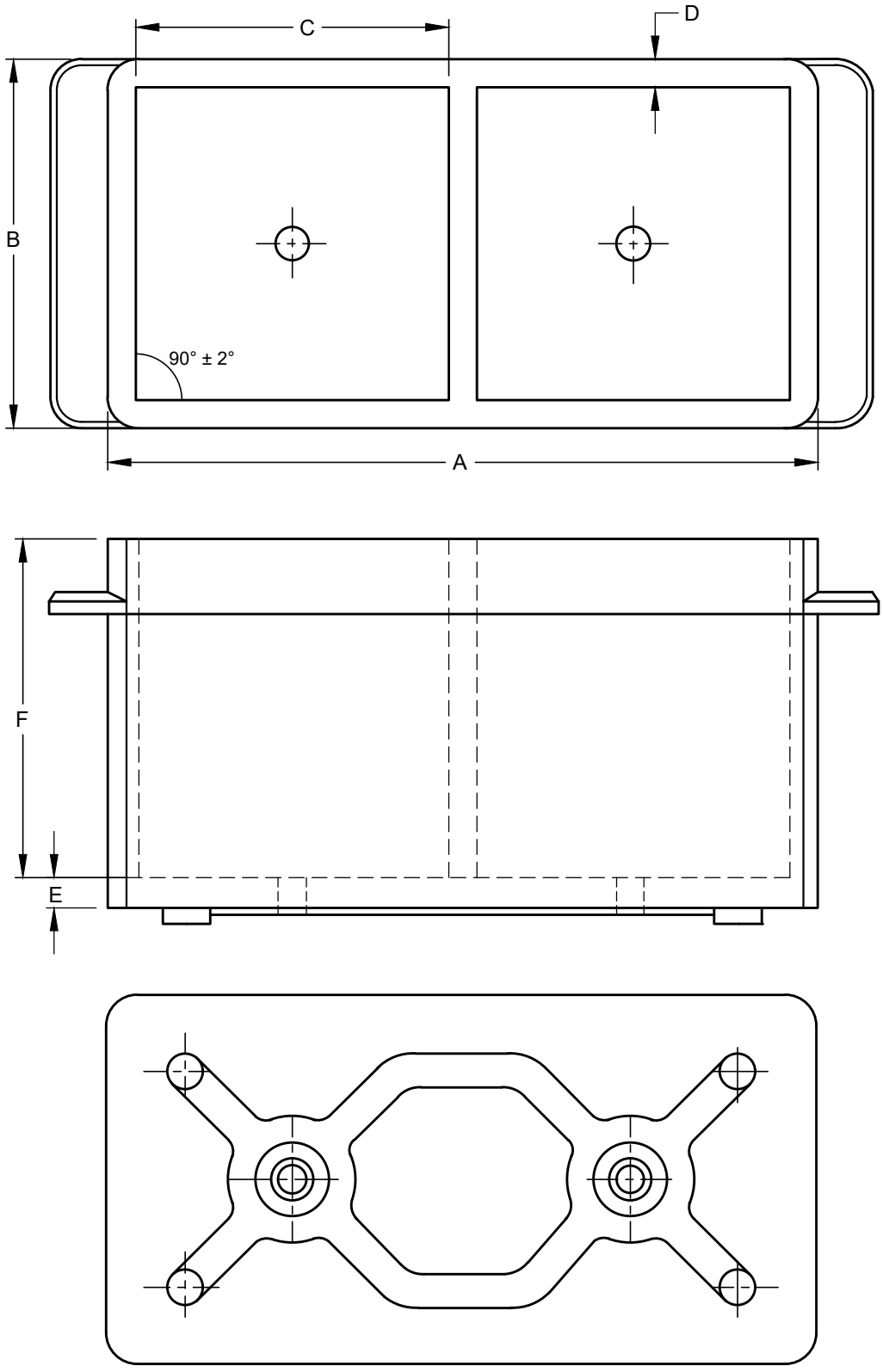
NOTE — Depending on chemical composition, the wall/base thicknesses may vary to enable arrive at dimensions of the concrete beam.

FIG. 12 TYPICAL RIGID POLYURETHANE BEAM MOULD



NOTE — Depending on chemical composition, the wall/base thicknesses may vary to enable arrive at dimensions of the concrete cube.

FIG. 13 TYPICAL ABS PLASTIC 3 – GANG 50 MM CUBE MOULD



NOTE – Depending on chemical composition, the wall/base thicknesses may vary to enable arrive at dimensions of the concrete cube.

FIG. 14 TYPICAL ABS PLASTIC 2 – GANG CUBE MOULD

6.1.2 The inside faces of the mould plates and base plates made of metal may have blowholes and blemishes on the surface, such as honey-combing. All such blowholes and cavities shall be fitted in with mild steel pins, or by welding and shall be finished flush with the surface either by machining or by filing. However, the number of blowholes on each plate acceptable may not exceed 5 in the case of cube moulds of up to and including size 150 mm and 10 in the case of cube moulds of sizes 225 mm and 300 mm, cylindrical mould of 150 mm diameter and 300 mm height and beam moulds of sizes 100 × 100 × 500 mm and 150 × 150 × 700 mm. The sizes of the blowhole in any direction may not exceed 5 mm with a depth of 3 to 5 mm. In the case of cylindrical mould, the sizes of blowhole/cavity in any direction may not exceed 20-25 mm. The moulds made of ABS plastic and polyurethane shall additionally conform to the requirements given in Table 6 and Table 7. *See* Note. The dimensional stability when tested as per IS 11239 (Part 3) shall not be more than ± 2 mm at 70 ± 3 °C and also at 0 ± 3 °C. The requirement for drop test shall be as given in **6.1.3**.

NOTE — After removing the stopper at the base, pneumatic air pressure may be used to remove the concrete specimen from the ABS plastic/polyurethane moulds.

6.1.3 The mould filled with concrete shall be dropped, ensuring free fall, from a height of 1.5 m holding upright its top, bottom and side face once on to a 150 mm thick bed of sand. The surface dimensions of the bed shall be larger than the largest surface of the specimen under test. A suitable enclosure with felt lining or any other suitable arrangement may be provided around the sand bed to avoid damage on account of instrument accidently falling on the hard surface.

6.2 Special Requirements

6.2.1 *Cube Mould*

Cube mould of 50 mm size shall be either a single mould (*see* Fig. 1, 9 and 10) or with more than one mould compartment (*see* Fig. 2, 13 and 14); however, the number of mould compartments shall not exceed 3. The dimensions and tolerances of various types of gang cube moulds (*see* Fig. 2, 13 and 14) shall be as given in Table 8. Cube moulds may be provided with a base plate.

NOTES

1 For accelerated curing of concrete specimens as per IS 9013, moulds made of cast iron/mild steel and polyurethane only shall be used.

2 If required by the purchaser, cube moulds may be provided with flat steel cover plates.

3 Plastic moulds shall not be used for accelerated curing (in which 3.5 h of 100 + 2 °C of water and 55 °C of boiling water for 5 min).

6.2.2 *Cylindrical Mould* (*see* Fig. 3 and 11) — Each mould shall be provided with a base plate and a capping plate.

6.2.3 *Beam Mould* (*see* Fig. 4 and 12) — The mould may be constructed with the longer dimension horizontal. Each mould shall be provided with a base plate.

6.2.4 *Bar Mould* — The bar mould may be a single one or with more than one mould compartment. Each end plate of the mould shall be equipped to hold properly in place a stainless steel reference point having a diameter of 6 mm. The reference points may be either smooth or knurled end threaded. The reference points shall be so set that their principal axis coincides with the principal axis of the mould and shall extend 16 mm inside the mould. Each mould shall be provided with a base plate. Typical bar moulds are shown in Fig. 5. 6, 7 and 8.

6.3 Arrangement of Fastening/Clamping/ De-moulding

The base plate where applicable shall preferably be attached to the mould by cleats which may either be spring-loaded or secured with threaded studs and nuts/wing nuts. The mould or the parts of the mould, when assembled shall be positively and rigidly held together during filling, subsequent handling and

Table 6 Additional Requirements for ABS Plastic Moulds

(*Clause* 6.1.2)

Sl No.	Mould Type	Weight g	Hardness Scale[1)] Shore D Value	Wall Thickness mm
(1)	(2)	(3)	(4)	(5)
i)	50 × 50 × 50 mm cube mould	110 ± 10	75 – 78	6
ii)	100 × 100 × 100 mm cube mould	540 ± 10	75 – 78	9.5
iii)	100 × 100 × 100 mm 2-gang cube mould	960 ± 10	75 – 78	9
iv)	150 × 150 × 150 mm cube mould	1 120 ± 10	75 – 78	9.5
v)	50 × 50 × 50 mm 3-gang cube mould	830 ± 10	75 – 78	6

[1)] Shore hardness value shall be determined as in IS 13360 (Part 5/Sec 11)

Table 7 Additional Requirements for Rigid Polyurethane Moulds

(*Clause* 6.1.2)

Sl No.	Model Type	Weight g	Hardness Scale[1)] Shore D Value	Wall Thickness mm	Density g/cm^3
(1)	(2)	(3)	(4)	(5)	(6)
i)	100 × 100 × 100 mm cube mould	450 ± 10	60 – 62	12.5	0.40
ii)	150 × 150 × 150 mm cube mould	1 350 ± 10	55 – 58	19	0.38
iii)	100 × 200 mm cylinder mould	840 ± 10	60 – 62	15	0.45
iv)	100 × 100 mm 2-gang cube mould	900 ± 10	55 – 58	19	0.45
v)	150 × 300 mm cylinder mould	1 950 ± 10	45 – 50	25	0.32
vi)	100 × 100 × 500 mm beam mould	2 300 ± 10	55 – 58	19	0.40
vii)	150 × 150 × 700 mm beam mould	4000 ± 10	55 – 58	25	0.40

[1)] Density shall be determined as in IS 13360 (Part 3/Sec 10)

Table 8 Dimension and Tolerances of Gang Cube Moulds

(*Clause* 6.2.1)

Sl No.	Description	Material of the Mould	Cube Mould Size and Type	
			2-gang 100 mm Cube Mould	3-gang 50 mm Cube Mould
(1)	(2)	(3)	(4)	(5)
i)	Distance between opposite faces, *C*, mm	Cast iron/mild steel	–	50±0.1
		ABS plastic	100±0.2	50±0.1
ii)	Height of mould, *F*, mm	Cast iron/mild steel	–	50±0.1
		ABS plastic	100±0.2	50±0.1
iii)	Thickness of wall plate, *D*, mm	Cast iron/mild steel	–	6
		ABS plastic	9.2	6
iv)	Deviation from perpendicularity between adjacent interior faces of the mould, mm, *Max*	Cast iron/mild steel	–	0.5
		ABS plastic	0.5	0.5
v)	Deviation from perpendicularity between interior faces and top and bottom face/plates of the mould, mm, *Max*	Cast iron/mild steel	–	0.5
		ABS plastic	0.5	0.5
vi)	Length of base plate, *A*, mm	Cast iron/mild steel	–	210
		ABS plastic	–	285
vii)	Width of base plate, *B*, mm	Cast iron/mild steel	–	120
		ABS plastic	–	111
viii)	Thickness of base/base plate, *E*, mm	Cast iron/mild steel	–	5
		ABS plastic	9.5	5
ix)	Permissible variation in the planeness of interior faces for, mm, *Max*:	Cast iron/mild steel	–	0.03
			–	0.05
	a) New mould	ABS plastic	0.06	0.06
	b) Mould in use		0.08	0.08
x)	Permissible variable in the planeness of base plate, mm, *Max*	Cast iron/mild steel	0.03	0.03
		ABS plastic	0.06	0.06

NOTE — The letter symbols are indicated in Fig. 2, 13 and 14.

vibration where applicable. Any suitable method of ensuring this by way of lock nuts and/or locating pins may be employed. In case of moulds made of ABS plastic and rigid polyurethane, compaction should be done using vibration instead of tamping. For release of concrete sample from the mould after removing the stopper (made of rubber or plastic) at the base, pneumatic air pressure using standard air compressor up to 8 bar (depending on size of mould) shall be used.

7 ACCESSORIES

7.1 Tamping Rod

The tamping rod shall be of the following types:

a) 16 ± 0.5 mm dia and 600 mm ± 2 mm long with a rounded working end shall be made of mild steel (*see* Fig. 15).

b) Of square section with tamping face 25 ± 0.5 mm square and 300 ± 2 mm long and weighing 2 kg shall be made of mild steel and provided with a handle (*see* Fig. 16).

c) Of 12 mm × 25 mm cross-section and convenient length of 125 mm to 150 mm; tamping face shall be flat and at right angles to the length of the bar, shall be made of non-absorbent, abrasion resistant non-brittle material, such as a rubber compound having a shore A durometer hardness of 80 ± 10 or seasoned teak wood rendered non-absorbent by immersion for 15 mm in paraffin at approximately 200 °C, or ebonite fibre.

7.2 Gauging Trowel

The gauging trowel shall be made of mild steel or stainless steel (grade SS 304) and shall be in accordance with Fig. 17. The trowel blade shall be of minimum thickness 1.5 mm and of length 195 mm to 205 mm and shall be provided with a wooden/plastic moulded handle. The trowel shall weigh 210 g ± 5 g.

NOTE — Optional coatings on mild steel namely zinc coating, cadmium coating, chrome plating may be provided.

7.3 Trowel

The trowel shall be made of mild steel (with suitable coating) or stainless steel (grade SS 304) and shall be in accordance with Fig. 17. The trowel blade shall be of minimum thickness 1.5 mm and 100 mm to 150 mm length with straight edges.

8 MARKING

8.1 The following information shall be cast clearly and indelibly on each component of the mould and the accessories as far as practicable in a way that it does not interfere with the performance of the mould:

a) Name of the product,

b) Material of the mould (cast iron/mild steel/ABS plastic/polyurethrane),

c) Nominal dimensions of the mould,

d) Manufacturer or his registered trade mark or both, and

e) Batch No./Lot No. traceable to the date of manufacture.

8.2 BIS Certification Marking

The moulds conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of *Bureau of Indian Standards Act,* 2016 and the Rules and Regulations framed thereunder, and the moulds may be marked with the Standard Mark.

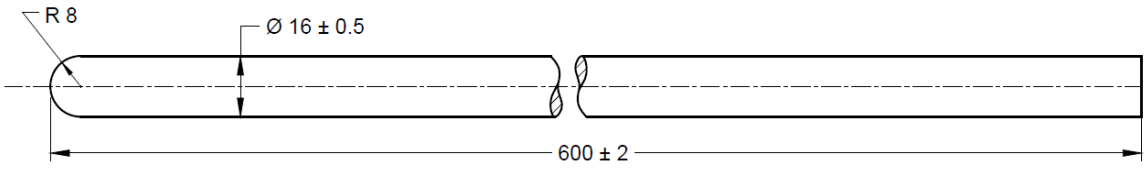
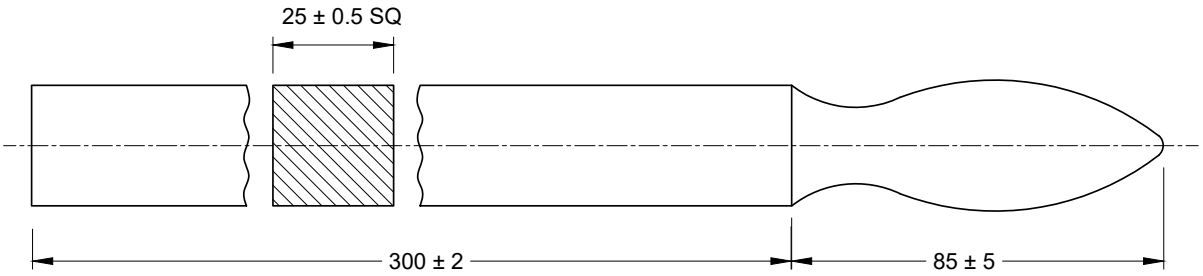
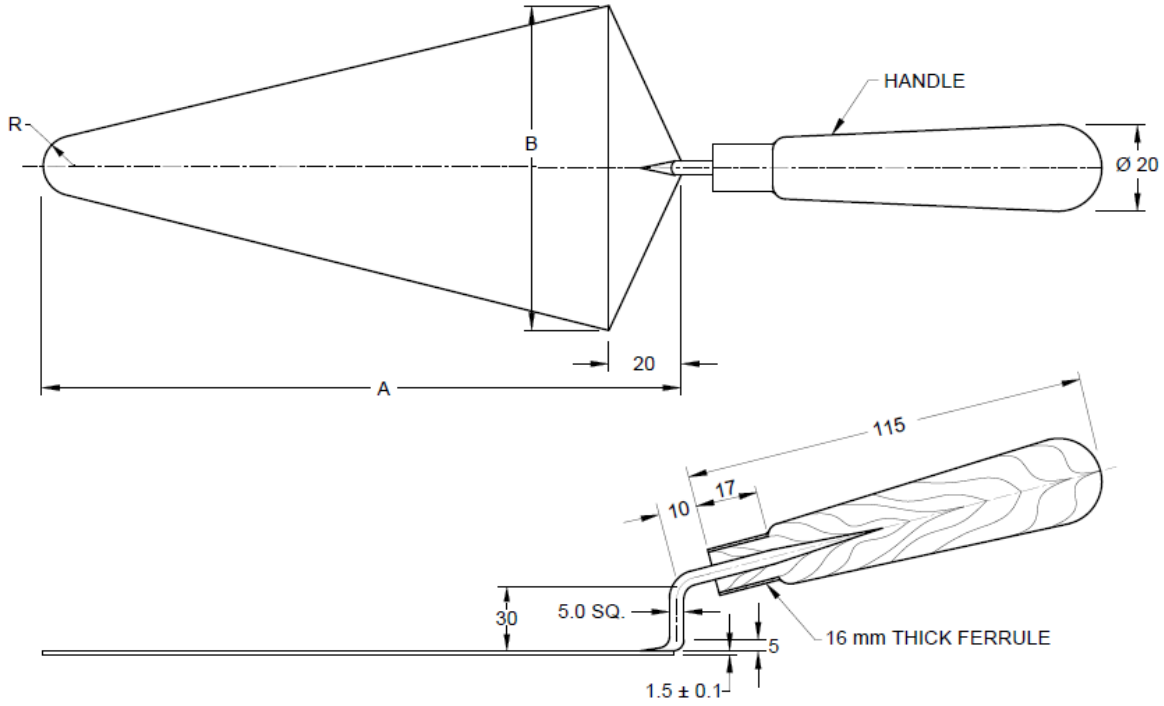


FIG. 15 TYPICAL TAMPING ROD



All dimensions in millimetres

FIG. 16 TYPICAL TAMPING BAR



	A	B	R
GAUGING TROWEL	195 - 205	90	12.5
TROWEL	100 - 150	85	10

FIG. 17 TYPICAL TROWEL

ANNEX A

(*Clause* 2)

LIST OF CROSS REFERRED INDIAN STANDARDS

IS No.	*Title*
210 : 2009	Grey iron castings — Specification (*fifth revision*)
2062 : 2011	Hot rolled medium and high tensile structural steel — Specification (*seventh revision*)
2102 (Part 1) : 1993/ISO 2768-1 : 1989	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*)
6527 : 1995	Stainless steel wire rods — Specification (*first revision*)
9013 : 1978	Method of making, curing and determining compressive strength of accelerated cured concrete test specimens
10078 : 1982	Specification for jolting apparatus for testing cement
10080 : 1982	Specification for vibration machine
11239 (Part 3) : 2009/ ISO 2796 : 1986	Method of test for rigid cellular thermal insulation materials: Part 3 Dimensional stability (*first revision*)
13360 (Part 3/Sec 10) : 2016/ISO 1183-1 : 2012	Plastics — Methods of testing: Part 3 Physical and dimensional properties, Section 10 Determination of density of non-cellular plastics — Immersion method, liquid pyknometer method and titration method
13360 (Part 5/Sec 11) : 2013/ISO 868 : 2003	Plastics — Methods of testing: Part 5 Mechanical properties, Section 11 Determination of indentation hardness of plastics by means of durometer (Shore hardness) (*first revision*)

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Cement and Concrete Sectional Committee, CED 02

Organization	*Representative(s)*
In Personal Capacity (*Grace Villa, Kadamankulam PO, Thiruvalla 689 583, Kerala*)	Shri Jose Kurian (***Chairman***)
ACC Ltd, Mumbai	Shri Rakesh J. Modi Dr Manish V. Karandikar (*Alternate*)
Ambuja Cements Limited, Ahmedabad	Shri Umesh P. Soni Shri Sukuru Ramarao (*Alternate*)
Atomic Energy Regulatory Board, Mumbai	Shri L. R. Bishnoi Shri Sourav Acharya (*Alternate*)
Builders' Association of India, Mumbai	Shri Sushanta Kumar Basu Shri D. R. Sekor (*Alternate*)
Building Materials and Technology Promotion Council, New Delhi	Shri S. K. Gupta Shri C. N. Jha (*Alternate*)
Cement Manufacturers' Association, Noida	Dr V. Ramachandra Shri Prakhar Shrivastava (*Alternate*)
Central Public Works Department, New Delhi	Shri A. K. Rajdev Shri Saurobh Kumar (*Alternate*)
Central Soil and Materials Research Station, New Delhi	Shri U. S. Vidyarthi Shri B. K. Munzni (*Alternate*)
Central Water Commission, New Delhi	Director (CMDD) (N & W) Deputy Director (CMDD) (NW & S)
Conmat Technolgies Pvt Ltd, Kolkata	Dr A. K. Chatterjee Dr Subrato Chowdhury (*Alternate*)
Construction Chemical Manufacturers' Association, Mumbai	Shri Samir Surlaker Shri Nilotpol Kar (*Alternate*)
CSIR-Central Building Research Institute, Roorkee	Dr Santha Kumar Dr Jeeshan Khan (*Alternate*)
CSIR-Central Road Research Institute, New Delhi	Dr Rakesh Kumar Dr V. V. L. Kanta Rao (*Alternate*)
CSIR-Structural Engineering Research Centre, Chennai	Dr K. Ramanjaneyulu Dr P. Srinivasan (*Alternate*)
Delhi Development Authority, New Delhi	Chief Engineer (Design) Executive Engineer (Design) (*Alternate*)
Engineers India Limited, New Delhi	Shri Anurag Sinha Shri Vikram K. Gupta (*Alternate*)
Deptt of Science &Technology, Ministry of Science and Technology, New Delhi	Shri Sajid Mubashir Ms Namita Gupta (*Alternate*)
Gammon Engineers & Contractors Pvt Ltd, Mumbai	Representative

Organization	*Representative(s)*
Hindustan Construction Company Ltd, Mumbai	Shri Satish Kumar Sharma Shri Mukesh Valecha (*Alternate*)
Housing and Urban Development Corporation Limited, New Delhi	Shri Deepak Bansal
Indian Association of Structural Engineers, New Delhi	Shri Mahesh Tandon Shri Ganesh Juneja (*Alternate*)
Indian Concrete Institute, Chennai	Shri Vivek Naik Secretary General (*Alternate*)
Indian Institute of Technology Delhi, New Delhi	Dr Shashank Bishnoi Dr Dipti Ranjan Sahoo (*Alternate*)
Indian Institute of Technology Madras, Chennai	Prof Devdas Menon Prof Manu Santhanam (*Alternate*)
Indian Institute of Technology Roorkee, Roorkee	Prof V. K. Gupta Dr Bhupinder Singh (*Alternate*)
Indian Roads Congress, New Delhi	Shri S. K. Nirmal Shri R. V. Patil (*Alternate*)
Military Engineer Services, Engineer-in-Chief's Branch, Integrated HQ of MoD (Army), New Delhi	Major Gen S. K. Khanna
Ministry of Road Transport & Highways, New Delhi	Shri Y. Balakrishna Shri Sanjeev Kumar (*Alternate*)
National Council for Cement and Building Materials, Ballabgarh	Shri P. N. Ojha Dr S. K. Chaturvedi (*Alternate* I) Shri Brijesh Singh (*Alternate* II)
National Test House, Kolkata	Shri D. V. S. Prasad Dr Somit Neogi (*Alternate*)
Nuclear Power Corporation of India Ltd, Mumbai	Shri Arvind Shrivastava Shri Raghupati Roy (*Alternate*)
Nuvoco Vistas Corporation Ltd, Mumbai	Shri Pranav Desai Shri Ravindra Khamparia (*Alternate*)
Public Works Department, Govt of Tamil Nadu, Chennai	Superintending Engineer Executive Engineer (*Alternate*)
The India Cements Limited, Chennai	Representative
The Indian Hume Pipe Company Limited, Mumbai	Shri P. R. Bhat Shri S. J. Shah (*Alternate*)
The Institution of Engineers (India), Kolkata	Dr H. C. Visvesvaraya Shri S. H. Jain (*Alternate*)
The Ramco Cements Limited, Chennai	Shri Balaji K. Moorthy Shri Anil Kumar Pillai (*Alternate*)
Ultra Tech Cement Ltd, Mumbai	Shri Surya Valluri Dr M. R. Kalgal (*Alternate* I) Shri Muralidhar Potnuru (*Alternate* II)
Voluntary Organization in Interest of Consumer Education, New Delhi	Shri M. A. U. Khan

Organization	*Representative(s)*
In Personal Capacity [*B-806, Oberoi Exquisite Oberoi Garden City, Goregaon* (*East*)*, Mumbai 400 063*]	Shri A. K. Jain
In Personal Capacity (*36, Old Sneh Nagar, Wardha Road, Nagpur 440 015*)	Shri L. K. Jain
In Personal Capacity (*EA-92, Maya Enclave Hari Nagar, New Delhi 110 064*)	Shri R. C. Wason
In Personal Capacity (*113, Sector 11D, Faridabad*)	Shri V. V. Arora
BIS Directorate General	Shri Sanjay Pant, Scientist 'F' and Head (Civil Engineering) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri Arun Kumar S.
Scientist 'E' (Civil Engineering), BIS

Composition of the Cement, Pozzolana and Cement Additives Subcommittee, CED 2 : 1

Organization	*Representative*
In Personal Capacity, New Delhi	Shri K. H. Babu (***Convener***)
20 Microns Limited, Mumbai	Shri Atil Parikh Shri Sunil Mistry (*Alternate*)
ACC Limited, Mumbai	Shri Pralhad Mujumdar Shri Anil Kulkarni (*Alternate*)
AIMIL Limited, New Delhi	Shri Madan Kumar Sharma Shri Yogin Chandorkar (*Alternate*)
Ambuja Cement Limited, Mumbai	Shri Sukuru Ramarao Shri Umesh P. Soni (*Alternate*)
Building Material and Technology Promotion Council, New Delhi	Shri C. N. Jha Shri Sharad Gupta (*Alternate*)
CSIR-Central Building Research Institute, Roorkee	Shri S. K. Gupta Shri Micky M. Delbehra (*Alternate*)
CSIR-Central Road Research Institute, New Delhi	Shri J. B. Sengupta Shri Satish Pandey (*Alternate*)
Cement Corporation of India Limited, New Delhi	Shrimati Saraswathi Devi Ms Bibha Kumari (*Alternate*)
Cement Manufacturers Association, New Delhi	Shri Ashwani Pahuja Dr S. K. Saxena (*Alternate*) Shri Shubho Chakravarty (*Young Professional*)
Central Electricity Authority, New Delhi	Shri Y. K. Sharma Shri Mohan Kumar (*Alternate*)
Central Pollution Control Board, New Delhi	Ms Divya Sinha Shri P. K. Gupta (*Alternate*)
Central Public Works Department, New Delhi	Shri A. K. Rajdev Shri Naveen Kumar Bansal (*Alternate*)
Central Soil and Materials Research Station, New Delhi	Shri Raj Kumar Shri N. V. Mahure (*Alternate*)

Organization	*Representative*
Dalmia Cement (Bharat) Limited, New Delhi	Shri Prateek Gaur Shri Shashi Bhushan (*Alternate*)
Department of Science & Technology, Ministry of Science and Technology, New Delhi	Shri S. S. Kohli
Elkem South Asia Private Limited, Navi Mumbai	Shri Brajesh Malviya Shri Surendra Sharma (*Alternate*)
Gammon Engineers and Contractors Private Limited, Mumbai	Shri Avinash Y. Mahendrakar
Gujarat Engineering Research Institute, Vadodara	B. H. Chaudhari Shri R. J. Soni (*Alternate*)
Hindustan Construction Company Limited, Mumbai	Shri Satish Kumar Sharma Shri Khatarbatcha Jimmetian (*Alternate*)
Indian Concrete Institute, Chennai	Dr Anant M. Pande Secretary General (*Alternate*)
Indian Institute of Technology Delhi, New Delhi	Dr Shashank Bishnoi Dr Supratic Gupta (*Alternate*)
Institute for Solid Waste Research and Ecological Balance Inswared, Visakhapatnam	Shri N. Kalidas Dr N. Bhanumathidas (*Alternate*)
JSW Cement Limited, Mumbai	Shrimati Lopamudra Sengupta Dr Jagabandhu Kole (*Alternate*)
Maharashtra Engineering Research Institute, Nashik	Scientific Research Officer Assistant Research Officer (*Alternate*)
Military Engineer Services, Engineer-in-Chief's Branch, Army HQ, New Delhi	Shri Pradeep Aggarwal Shri M. K. Deepak (*Alternate*)
Ministry of Commerce and Industry, New Delhi	Shri Mohd Zakaria Khan Yusufzai Shri Sunil Agarwal (*Alternate*)
National Council for Cement and Building Materials, Faridabad	Dr S. K. Chaturvedi Shri P. N. Ojha (*Alternate* I) Shri Brijesh Singh (*Alternate* II)
National Hydroelectric Power Corporation, Faridabad	Shri R. M. A. Khan
National Test House, Kolkata	Shri D. V. S. Prasad Dr Moitrayee Devi (*Alternate*)
Netra NTPC Limited, Noida	Deputy General Manager Shri Masoom Ali (*Alternate*)
Nuvoco Vistas Company Limited, Mumbai	Shri Pranav Desai Shri Ravindra Khamparia (*Alternate*)
Public Works Department, Government of Tamilnadu, Chennai	Joint Chief Engineer Executive Engineer (*Alternate*)
Tata Steel Limited, Jamshedpur	Shri A. S. Reddy Shri Vipul Mohan Koranne (*Alternate*)
Ready Mixed Concrete Manufacturers Association, Mumbai	Shri A. K. Jain
Tamil Nadu Minerals Limited, Chennai	Shri V. Santhanam Shri E. Ganesan (*Alternate*)
The Ramco Cements Limited, Chennai	Shri Anil Kumar Pillai Shri Balaji K. Moorthy (*Alternate*)

Organization	*Representative*
UltraTech Cement Limited, Mumbai	Shri Ashok K. Tiwari Dr Awadhesh K. Singh (*Alternate*)
In Personal Capacity (*P 9-3D, SRS Residency, Sector 88, Faridabad 121 002*)	Shri S. Harsh
In Personal Capacity (*113, Sector 11D, Faridabad*)	Shri V. V. Arora

Composition of the Panel for Revision of Cement Standards, CED 2 : 1/P1

Organization	*Representative(s)*
In Personal Capacity (*Type IV-17, Presidents Estate, New Delhi 110 004*)	Shri K. H. Babu (***Convener***)
AIMIL Limited, New Delhi	Shri Sharique Khan Shri Aman Khullar (*Alternate*)
CSIR-Central Building Research Institute, Roorkee	Dr Neeraj Jain Dr Santha Kumar (*Alternate* I) Dr Jeeshan Khan (*Alternate* II)
Cement Manufacturers Association, New Delhi	Dr A. K. Singh Dr Manish Karandikar (*Alternate*) Dr Shubho Chakravarty (*Young Professional*)
Central Public Works Department, New Delhi	Chief Engineer (DDM) Superintending Engineer (D) II (*Alternate*)
Military Engineer Services, Engineer-in-Chief's Branch, Army HQ, New Delhi	Shri Pradeep Aggarwal Shri M. K. Deepak (*Alternate*)
National Council for Cement and Building Materials, Ballabgarh	Dr S. K. Chaturvedi Shri P. N. Ojha (*Alternate* I) Dr Pinky Pandey (*Alternate* II)
Ready Mixed Concrete Manufacturers Association, Mumbai	Shri Devendra Kumar Pandey Shri A. K. Jain (*Alternate*)
In Personal Capacity (*P9-3D, SRS Residency, Sector-88, Faridabad 121 002*)	Shri S. Harsh

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: CED 02 (15454).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	2323 7617, 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi, KOLKATA 700054	2337 8499, 2337 8561, 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019	265 0206, 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442, 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East), MUMBAI 400093	2832 9295, 2832 7858, 2832 7891, 2832 7892

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi